

State of Vermont
Public Service Board

Docket No. 6545

Investigation in General Order No. 45)
Notice filed by Vermont Yankee Nuclear)
Power Corporation re: proposed sale)
of Vermont Yankee Nuclear Power Station)
and related transactions)

PREFILED TESTIMONY OF
BRUCE EDWARD BIEWALD
ON BEHALF OF THE
VERMONT DEPARTMENT OF PUBLIC SERVICE

REDACTED

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January 7, 2002

Summary: Mr. Biewald's testimony addresses the economics of the proposed sale of
Vermont Yankee.

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List of Exhibits

Exhibit___DPS-BEB-1	Resume of Bruce Edward Biewald
Exhibit___DPS-BEB-2	Key Inputs to Synapse Economic Analysis of Proposed Sale
Exhibit___DPS-BEB-3	Summary Results for Economic Analysis of Proposed Sale
Exhibit___DPS-BEB-4	Comparison of Synapse and Vermont Yankee Analyses
Exhibit___DPS-BEB-5	Annual Costs of VY, PPA Base Prices, and Market Price Forecasts
Exhibit___DPS-BEB-6	Table of ICAP Value by Capacity Factor

1 **1. Qualifications**

2 Q. State your name, occupation and business address.

3 A. My name is Bruce Edward Biewald. My address is Synapse Energy
4 Economics, Inc., 22 Pearl Street, Cambridge, Massachusetts, 02138.

5 Q. On whose behalf are you testifying in this case?

6 A. I am testifying on behalf of the Vermont Department of Public Service.

7 Q. Please describe your current employment.

8 A. I am President of Synapse Energy Economics, Inc., a consulting company
9 specializing in economic and policy analysis of the electric industry, including
10 restructuring, consumer protection, market power, stranded costs, renewables,
11 efficiency, environmental quality, and nuclear power.

12 Q. What are your qualifications with regard to electric utility regulation and energy
13 policy?

14 A. I graduated from the Massachusetts Institute of Technology in 1981, where
15 I studied energy use in buildings. I was employed for 15 years at the Tellus
16 Institute, where I was Manager of the Electricity Program, responsible for studies
17 on a broad range of electric system regulatory and policy studies. I have testified
18 on energy issues in more than seventy regulatory proceedings in twenty-five states,
19 two Canadian provinces, and before the Federal Energy Regulatory Commission. I
20 have co-authored more than one hundred reports, including studies for the Electric

1 Power Research Institute, the U.S. Department of Energy, the U.S. Environmental
2 Protection Agency, the Office of Technology Assessment, the New England
3 Governors' Conference, the New England Conference of Public Utility
4 Commissioners, and the National Association of Regulatory Utility
5 Commissioners. My papers have been published in the *Electricity Journal*, *Energy*
6 *Journal*, *Energy Policy*, *Public Utilities Fortnightly* and numerous conference
7 proceedings, and I have made presentations on the economic and environmental
8 dimensions of energy throughout the U.S. and internationally. Recently I have
9 been consulting for federal agencies, including the Department of Energy, the
10 Department of Justice, the Environmental Protection Agency, and the Federal
11 Trade Commission. My resume is provided here as Exhibit DPS-BEB-1.

12 Q. Have you previously testimony before the Vermont Public Service Board?

13 A. Yes. I testified on behalf of the Department of Public Service in the
14 following dockets:

- 15 1) Docket No. 5854 on electric industry restructuring (hearings in July
16 1996).
- 17 2) Docket No. 5983 on GMP's rates (direct testimony in October
18 1997, rebuttal testimony in December 1997, and supplemental
19 rebuttal testimony in January 1998).
- 20 3) Docket No. 6018 on CVPS's rates (direct testimony in February

1 1998).

2 4) Docket No. 6107 on GMP's rates (direct testimony in September
3 1998).

4 5) Dockets Nos. 6120 and 6460 on CVPS's rates (direct testimony in
5 March 2001, and surrebuttal testimony in April, 2001).

6

7 In addition, I have assisted the Department in other dockets including
8 CVPS and GMP rate cases (Dockets Nos. 6020 and 6107, respectively) which
9 were settled.

10

11 **2. Summary and Recommendations**

12 Q. What issues does your testimony address?

13 A. My testimony addresses the economics of the proposed sale of the
14 Vermont Yankee Nuclear Power Plant. I have analyzed "Keep" and "Sell" cases
15 from the perspective of costs to Vermont utilities, with and without license
16 extension. My analysis includes various sensitivity cases to key input assumptions.
17 I also comment on the transaction from the perspective of Entergy, as the buyer.

18 As discussed in this testimony, many of the input assumptions to this
19 economic analysis were provided to me by other witnesses for the Department of
20 Public Service in this case, specifically William Sherman, David Schlissel, David

1 Effron, and David Lamont. My analysis also builds upon the analysis filed in this
2 case by Vermont Yankee witness, Bruce Wiggett.

3 Q. Please summarize your findings.

4 A. Without license extension I project that the present value costs of keeping
5 and operating the Vermont Yankee plant are very similar to the costs of the sell
6 case. Specifically, I estimate a net benefit of \$13 million (in 2001 present value
7 dollars) for the sale compared to the keep case. However, because this result is
8 the difference between two large numbers (the projected costs in the keep and sell
9 cases) both of which are subject to uncertainty, the small net benefit should, in my
10 view, but thought of as a “breakeven” for practical purposes. Sensitivity cases
11 with high and low inputs for market prices, capacity uprate, and O&M costs show
12 results that range from a net benefit for the sale of \$38 million to a net cost for the
13 sale (i.e., a net benefit for the keep case) of \$22 million.

14 With license extension, I project that there will be a large benefit to keeping
15 the Vermont Yankee plant. Specifically, I calculate an expected net cost for the
16 sell case of \$266 million (in 2001 present value dollars) in the event of license
17 extension. In the set of sensitivity cases that I analyzed, this net cost for the sell
18 case ranges from \$157 million to \$363 million (in 2001 present value dollars).

19 Note that the cost results that I present here, and throughout my testimony
20 and exhibits are for the full Vermont Yankee plant. The Vermont utilities’ share of

1 the plant, and thus their share of the costs and benefits, is 55 percent of the total.

2 Q. What are your findings with respect to the PPA and the LMA?

3 A. The PPA is a unit contract for power that is part of the broader proposed
4 transaction transferring ownership of the Vermont Yankee plant. The
5 Department's market price forecast has prices below the PPA price in the early
6 years of the contract, rising to exceed the PPA prices in the later years of the
7 contract. The presence of a Low Market Adjuster in the PPA is a positive factor
8 of the sale, albeit diminished by the shortcomings I've identified below.

9 Q. What are your findings with respect to risks?

10 A. There are a number of risks and uncertainties that should be analyzed in
11 evaluating the sale of Vermont Yankee. I have worked through one example,
12 involving an extended outage, as an illustration of how such risks can be analyzed.
13 That sample outage scenario analysis shows that the proposed sale transfers some
14 risks, but that is somewhat tempered by the uncertainty of who will pay costs and
15 manage decommissioning if ENVY declares bankruptcy.

16 I also find that the petitioners' discussion of risks is cursory. The
17 petitioners should have considered a number of risk scenarios in their analysis of
18 the transaction.

19 Q. What did you find with respect to the costs and benefits to the buyer?

20 A. From the perspective of the buyer, Entergy Nuclear Vermont Yankee,

1 there are substantial opportunities to benefit from purchasing and operating the
2 Vermont Yankee plant. These derive from opportunities to cut operating costs,
3 improve availability (e.g., with 24 month refueling cycle), uprate the capacity, and
4 extend the plant's operating license.

5

6 **3. Method for Economic Analysis of the Sale of Vermont Yankee**

7 Q. How did you analyze the costs and benefits of the proposed sale of the Vermont
8 Yankee plant?

9 A. I began with the results of Vermont Yankee's own financial analysis as
10 presented in the direct testimony of Bruce Wiggett in this case. In Exhibits BW-9
11 and BW-10 Mr. Wiggett presented annual costs by category for keep and sell
12 cases, respectively. His results were based upon analysis using Vermont Yankee's
13 financial model. My analysis was conducted by importing Vermont Yankee's
14 results into a spreadsheet, and by making adjustments to the cost figures to reflect
15 differences in assumptions.

16 Q. Did you run Vermont Yankee's financial model?

17 A. I did not run the model as the basic method for producing economic results
18 in this case. I did, however, review the financial model runs provided by Vermont
19 Yankee in response to discovery in this case. I also visited Vermont Yankee's
20 office in order to review the model inputs and equations, and to make our own

1 runs. I also requested, and Vermont Yankee produced, a set of model runs with
2 inputs that I specified. All of this was useful for understanding Vermont Yankee's
3 model and assumptions, and to give me confidence that our approach was
4 reasonable in this case. It was not necessary to run Vermont Yankee's model to
5 make the adjustments that we believe to be appropriate.

6 Q. How does your approach compare with that of CVPS and GMP in this case, with
7 regard to the methodology?

8 A. My approach is virtually identical to that taken by CVPS witness Stephen
9 Page and GMP witness Nancy Brock. That is, we all relied upon the results of
10 Bruce Wiggett's analysis, and made various adjustments to those results without
11 re-running Vermont Yankee's financial model. We differ with regard to inputs,
12 but not methodology.

13 Q. How would you describe the essential method of your analysis?

14 A. It is a basic cost-benefit analysis, in which annual cost streams are
15 projected and then discounted to present value dollars. The net benefit (or cost) of
16 the transaction are determined by comparing a case with continued ownership (a
17 "keep case") to an analogous case with the proposed transaction (a "sell case").

18

19 **4. Inputs for Economic Analysis of the Sale of Vermont Yankee**

20 Q. What inputs did you use in analyzing the economics of the Vermont Yankee sale?

1 A. I used input assumptions from Vermont Yankee, from other witnesses for
2 the Department, and from my own analysis. A summary of my inputs with the
3 source for each is provided as Exhibit DPS-BEB-2.

4 Q. What input assumptions did you use that were from Vermont Yankee?

5 A. Because I relied upon the Vermont Yankee financial model results as a
6 starting point, there are many assumptions made by Bruce Wiggett and his
7 colleagues at Vermont Yankee that are embedded in the model and that carry over
8 into my analysis. Except where I have identified specific differences, I have relied
9 upon Vermont Yankee's assumptions. These include the general inflation rate of 3
10 percent, the discount rate of 10 percent, and many others.

11 Q. What are the specific differences between your analysis and Vermont Yankee's?

12 A. There are nine specific differences:

- 13 1. NEIL reimbursmenets
- 14 2. Schedule B generation
- 15 3. decommissioning funding
- 16 4. O&M cost reduction
- 17 5. nuclear security costs
- 18 6. spent fuel payment from DOE
- 19 7. capacity uprate
- 20 8. accounting adjustments
- 21 9. transaction date
- 22

23 I would like to briefly discuss each. In addition, I should discuss the inputs
24 for license extension and the market price forecast.

25 Q. What did you assume for NEIL reimbursements?

1 A. There is a refund due to Vermont Yankee for nuclear insurance. The value
2 of this refund should be counted as a credit in the Keep Case cost projection,
3 which is what I assumed. Note that this is, actually, the assumption made by
4 Bruce Wiggett, Stephen Page, and Nancy Brock, as well. I mention it specifically
5 for clarity, because it is the one item that Bruce Wiggett made as an adjustment in
6 his Exhibit BW-11, after his projections of annual costs (in Exhibits BW-9 and
7 BW-10). Because I used the cost figures from Exhibits BW-9 and BW-10, it was
8 appropriate for me to make an adjustment for NEIL reimbursements.

9 Q. What did you assume for Schedule B lost monthly generation?

10 A. Schedule B of the Power Purchase Agreement has monthly limits on
11 energy. The generation from Vermont Yankee can and does exceed these monthly
12 figures sometimes. To the extent that there is additional generation that would go
13 to Vermont customers in the keep case that they do not get in the sell case, the
14 energy should be valued at market and figured into the comparative analysis as a
15 cost to the sell case. That is, if Vermont Yankee wants this additional energy , it
16 will have to pay market prices rather than those established in the PPA.

17 I estimated the quantity of lost monthly generation by comparing the
18 Schedule B amounts with monthly generation reported by Vermont Yankee in
19 response to Data Request DPS 1-56. The amount of expected lost generation, on
20 an annual basis amounts to 62 GWH in refueling years and 103 GWH in non-

1 refueling years, or about 1.9 percent of the output of the plant.

2 Q. What did you assume for decommissioning funding?

3 A. I assumed that after 2002 there would be no further contributions to the
4 Vermont Yankee nuclear decommissioning fund. This applies to the keep and sell
5 cases, with and without license extension, and is supported in the testimony of
6 William Sherman in this case.

7 Q. What did you assume for O&M cost reductions?

8 A. First, I made an adjustment to Vermont Yankee's year 2012 O&M cost
9 figure. In the final year of its analysis Vermont Yankee assumed that the O&M
10 costs will be \$76 million. This is nearly a full year of O&M, for a year in which the
11 plant would, in the absence of license extension, close in March. Bruce Wiggett
12 has explained that this is due to the assumption that Vermont Yankee will require
13 eight months in order to complete its decommissioning plan. William Sherman has
14 informed me that he has concluded that these O&M costs should be avoided by
15 orderly planning for decommissioning.

16 Second, I made an adjustment to Vermont Yankee's projection of annual
17 O&M costs. Vermont Yankee projects annual O&M costs at \$64 million in 2002,
18 increasing gradually thereafter. I have reduced the O&M costs in my analysis by
19 \$3 million in refueling years and by \$5 million in non-refueling years. These
20 reductions in costs are in 2002 dollars, and are supported in the testimony of David

1 Schlissel.

2 Q. What did you assume for nuclear security costs?

3 A. I have assumed that nuclear security at Vermont Yankee will be tightened,
4 and that this will require a one time investment of \$1.1 million in 2002, and
5 increased annual O&M costs by \$1.5 million starting in 2002 (costs in 2002
6 dollars). These figures are from David Schlissel, based upon information provided
7 by Vermont Yankee in response to data request DPS 1-39 in this case.

8 Q. What did you assume for the spent fuel payment from DOE?

9 A. The courts have found that DOE has failed to fulfill its contractual
10 obligations to nuclear plant owners under the contracts for spent nuclear fuel
11 disposal. It is expected that DOE will provide payments to nuclear operators to
12 compensate them for costs incurred as a result of DOE's failure to perform.
13 William Sherman has estimated these costs, based upon information from Vermont
14 Yankee in this case. Because they are expected to go to Vermont Yankee in the
15 keep case, but to Entergy in the sell case, and I have included them as a credit to
16 the keep case.

17 Q. What did you assume for the capacity uprate?

18 A. I have assumed a capacity uprate at Vermont Yankee of 13 percent, to be
19 achieved in 3 steps as the fuel is replaced during routine refueling outages. In
20 effect, the annual average uprates (given partial years) average out as follows:

1	2002	zero
2	2003	2.5%
3	2004	8.33%
4	2005	10.5%
5	2006	13.0%

6 The cost of achieving the uprate is \$36.6 million, incurred in the years 2002
7 through 2005. The annual costs are \$7.5 million in 2002, \$15.8 million in 2003,
8 \$6.7 million in 2004, and \$6.6 million in 2005 (all in 2002 dollars). In addition, the
9 increased generation with the capacity uprate requires additional nuclear fuel. I
10 have included those costs by scaling Vermont Yankee's projected nuclear fuel cost
11 (the "annual capital addition" portion) by the uprate percentage.

12 In the sell case, Entergy would incur the costs of the uprate, and Entergy would
13 get the benefit from selling the additional generation at market prices. In the keep
14 case, Vermont Yankee would incur the costs and realize the value of the additional
15 generation.

16 Q. What did you assume for accounting adjustments?

17 A. David Effron recommended several adjustments based upon his review of
18 Vermont Yankee's financial model. These include recalculation of the gain or loss
19 on the case, accounting for equity remaining at the end of the study period, and
20 calculation of continuing income and income taxes. These are described in the
21 testimony of David Effron.

22 Q. What did you assume for the transaction date?

1 A. I have assumed that sale closes on July 15, 2002. Vermont Yankee's
2 analysis assumes that the sale closes in March, 2002. A July closing date appears
3 to be more likely given the schedule in this case, and the need for Vermont Yankee
4 to issue bonds subsequent to Board approval.

5 Q. For the cases with extension of Vermont Yankee's license, what did you assume?

6 A. In the license extension cases, I have assumed that the plant can operate for
7 an additional 20 years (through 2032), and that the initial investment in this is \$20
8 million. In addition, there are operating costs such as fuel and O&M associated
9 with the license extension period. David Schlissel's testimony describes the cost
10 and rationale for the license extension case.

11 Q. What did you assume for market prices for electricity?

12 A. In Vermont Yankee's analysis, the market price for electricity does not
13 figure into the cost difference between keep and sell cases. In one case Vermont
14 gets the generation from the plant and pays the costs of owning and operating it,
15 while in the other case Vermont gets the generation from the plant and pays the
16 price in the Power Purchase Agreement.

17 The market price for power is, however, important in my analysis because
18 the amount of generation that Vermont customers get differs between the keep and
19 sell cases for three reasons: the lost monthly generation, the capacity uprate, and
20 the license extension. For each of these, Vermont customers would effectively get

1 more energy from the plant in the keep case than in the sell case.
2 The market price forecast that I used in my analysis in this case is the
3 Department's latest market price forecast, described in the testimony of David
4 Lamont in this case.
5

6 **5. Results of the Economic Analysis of the Sale of Vermont Yankee**

7 Q. What do you find for the expected net benefit of the sale?

8 A. My results are summarized in Exhibit DPS-BEB-3. I find that without
9 license extension, the projected net benefit of the sale is \$13 million (in 2001
10 present value dollars). This figure is the difference between two large and
11 uncertain cost streams, and really means that for practical purposes under my base
12 case set of inputs the deal is a "breakeven" economically, without license
13 extension.

14 With license extension, however, there is a large net cost of the sale –
15 estimated at \$266 million.

16 Q. Please describe your sensitivity analyses.

17 A. I have analyzed a set of six sensitivity cases to the reference case without
18 license extension, and another six with license extension. These results are
19 summarized in Exhibit DPS-BEB-3. The sensitivity cases include higher and lower
20 market prices (plus and minus 10 percent from the reference case DPS forecast);

1 higher and lower Vermont Yankee uprates (20 percent and 10 percent, instead of
2 the reference case 13 percent uprate); and higher and lower O&M cost savings (no
3 savings relative to Vermont Yankee's projected O&M costs, and double the
4 reference case savings).

5 For the sensitivity cases without license extension, the results for the
6 sensitivity cases range from \$38 million net benefit of sale to \$22 million net cost
7 of sale (in 2001 present value dollars). For the cases with license extension, the
8 sensitivity results range from \$157 million net cost of the sale to \$363 million net
9 cost of the sale (in 2001 present value dollars).

10 Q. Can you explain the differences between your analysis and Vermont Yankee's?

11 A. Yes, I have conducted an analysis of the differences between Bruce
12 Wiggett's results and my result by changing one assumption at a time. The results
13 are presented in Exhibit DPS-BEB-4.

14 The four most significant sources of difference in the results are (1)
15 decommissioning at \$111 million; (2) capacity uprate at \$56 million; (3) spent fuel
16 payment at \$27 million; and (4) O&M cost reductions at \$44 million. Together,
17 these are responsible for 97 percent of the \$245 million difference between my
18 result and Bruce Wiggett's result.

19 **6. The Purchased Power Agreement**

20 Q. Please describe the Purchased Power Agreement.

1 A. The PPA is an important part of the proposed transaction. It is a contract
2 between Entergy Nuclear Vermont Yankee, LLC and Vermont Yankee Nuclear
3 Power Corporation, under which VYNPC would purchase the “facility product”
4 through March of 2012 at specified “base prices.” Under the PPA, if ENVY
5 decides to uprate the plant’s capacity or extend its operation beyond 2012, the
6 additional output belongs to ENVY to sell into the market. The base prices in the
7 PPA are compared with market price forecasts in Exhibit DPS-BEB-5. The
8 Department’s market price forecast is lower than the PPA price in the near term,
9 but is expected to rise above the PPA price in 2006. The PPA also has a Low
10 Market Adjuster (“LMA”) that provides for adjustments to the base price in the
11 event that New England market prices are more than 5 percent below the base
12 prices.

13 Q. Is the PPA a “unit” purchase?

14 A. Yes. Under the PPA, VYNPC buys output from the Vermont Yankee
15 station. When the plant is off line for planned or unplanned outage, no energy is
16 transacted.

17 Q. How does this compare with a “system” purchase?

18 A. With a system purchase, the transaction is backed by other resources, and
19 delivery of power is not curtailed in the event of a generator outage. A system
20 purchase would, in general, be more valuable than a unit purchase, in that the unit

1 purchase may experience “lumpy” outages, either temporary or permanent. To the
2 extent such outages can be anticipated, it is possible to line up other resources to
3 fill in the gap, but this of course has a price. To the extent that such outages are
4 not anticipated, the effort to replace the power can be particularly expensive or
5 problematic, depending upon the timing requirements and system conditions at the
6 time.

7 Q. Is it reasonable to evaluate the PPA as one would evaluate a stand alone power
8 contract?

9 A. No. The PPA is one part of a complex transaction that also includes the
10 transfer of a substantial generating asset, along with various responsibilities, risks
11 and opportunities associated with that asset. The transaction includes the transfer
12 of the decommissioning fund, as well as the responsibility for decommissioning.
13 My understanding is that the sale of Vermont Yankee was negotiated as a package
14 that included the PPA.

15 Thus, while it may be interesting for some purposes to compare the PPA
16 with a stand alone power contract (e.g., to compare the the PPA price with the
17 expected market price) the basic framework for evaluating the proposed
18 transaction should consider the PPA in context, and compare continued ownership
19 to a sell case that includes the PPA. I have taken this more comprehensive
20 approach in the economic analysis described in this testimony.

1 It is not reasonable to conclude that because the PPA is above market
2 prices during some portion of the remainder of plant operation that the plant
3 should be closed or that the deal is a bad one. A decision about plant retirement
4 compared to continued operation should be made on the basis of forward going
5 costs that would be incurred (or that can be avoided) in each of the cases. The
6 proposed transaction should be understood as a potential opportunity to improve
7 the current situation. In this context, the transaction should be evaluated relative
8 to other possible scenarios, the most obvious of which is continued ownership and
9 operation by VYNPC.

10 Q. How do the PPA base prices compare with projected market prices?

11 A. The Department's forecast is for market prices to increase after 2004 such
12 that they exceed the PPA base price beginning in 2006. This has implications in
13 that the above market prices in the near term are more certain to materialize than
14 the below market prices in the longer term, which must be weighed along with all
15 the other pros and cons.

16 Q. Please describe the Low Market Adjuster.

17 A. The Low Market Adjuster ("LMA") is a clause in the PPA designed to
18 protect the buyer in the event market prices fall to more than 5 percent below the
19 PPA base prices. This feature of the contract assures the buyer that it will pay the
20 lower of either the base PPA price or an adjusted price using the LMA. The LMA

1 becomes effective when the market price falls below 95% of the base price of the
2 PPA. Should that happen, the adjusted price under which power is sold under the
3 PPA is 105% of the 12 month average "market price" as defined in the PPA.

4 Q. Please describe the calculation of the "market price."

5 A. For purposes of the LMA, the "market price" for any month is defined as
6 the average spot clearing price over the previous 12 months plus the actual
7 published clearing price for installed capacity ("ICAP"). If there is no published
8 clearing price for ICAP, a default value of 10% will be used. Currently ISO-NE
9 does not publish a clearing price for ICAP.

10 Q. Is 10% a reasonable proxy for the value of ICAP?

11 A. No. Exhibit DPS-BEB-6 translates various ICAP prices (stated in \$/kW-
12 month) into \$/MWh at various capacity factors. It also shows the implied value of
13 ICAP at the point where the LMA would become effective. There is some
14 variation, but it is about \$4/MWh.

15 Now I will convert that \$4/MWh price to an equivalent ICAP price in
16 \$/kW-month. Vermont Yankee operates at an average capacity factor of about
17 85%, including outages. An ICAP value of \$4.00 would translate into a price of
18 about \$2.50/kW-month at an 85% capacity factor. Of course if market prices
19 dropped further, the ICAP value would fall as well.

20 Q. How does this value compare to current and projected ICAP prices?

1 A. In their respective price forecasts, the Department, GMP and CV used
2 values in the \$1.50/kW-month range. Currently ICAP is trading at below
3 \$1.00/kW-month.

4 Q. When would the LMA begin to be effective?

5 A. The LMA does not become effective until the first billing date after the end
6 of the RFO25 refueling cycle. This is expected to be approximately October 2005.
7 The period prior to 2005 is the period where PPA prices are expected to be above
8 the market price. After 2005, the PPA price is expected to be below market
9 prices, and so for the Department's reference case market forecast, the LMA
10 would have no effect.

11 Q. What do you conclude about the LMA?

12 A. The LMA is a positive factor in that it provides a hedge against low market
13 prices, but the concerns listed above are negative factors.

14

15 **7. Risk Scenarios**

16 Q. What do the Companies in this case say about the risk aspects of the transaction?

17 A. Bruce Wiggett testifying on behalf of Vermont Yankee (at page 26) and
18 Nancy Brock testifying on behalf of GMP (beginning at page 10) both mention
19 that the proposed deal transfers risk to Entergy.

20 Q. Does the transaction transfer potential risks from Vermont Yankee to ENVY?

1 A. Yes. Unexpected occurrences are possible. Equipment failures, regulatory
2 non-compliances, generic BWR and other industry problems, are all examples of
3 plausible unexpected occurrences which could cause unplanned outages and higher
4 operating costs. Currently, the full costs of prudently incurred, higher costs would
5 likely be passed on to consumers. During unplanned outages, consumers would
6 pay all of VYNPC outage expenses and would also pay for replacement power
7 costs. The proposed sale shields consumers from these risks by the fixed-price
8 power purchase agreement and by requiring no payments to ENVY when power is
9 not delivered.

10 The effectiveness of the transfer of these risks to ENVY is, however,
11 limited by Entergy's proposed corporate structure and credit line as discussed in
12 the testimony of Andrea Crane on behalf of the Department in this case. That is,
13 the risks are transferred, but if the financial assurance amount is exhausted or
14 unavailable and in the event of ENVY bankruptcy, it is uncertain how costs
15 associated with these risks would be paid.

16 Q. Does the transaction also transfer potential benefits from Vermont Yankee to
17 ENVY?

18 A. Yes. Benefits unanticipated by the analysis of the transaction are possible.
19 As described earlier, I chose a base case for the evaluation of the transaction
20 which, in my judgement, represents the most likely economic outcome. It would

1 be possible for VYNPC to experience better economic performance. For example,
2 in the last three years in a row, Vermont Yankee has exceeded the capacity factor
3 assumed in my analysis. This represents benefit given up in the transaction that is
4 not captured in my base case evaluation. Another example is the 2001 economic
5 results. As of the end of November 2001, Vermont Yankee was \$21 million under
6 its predicted budget for the year. Other up side potential includes the use of the
7 site for other uses (which could provide additional revenues to the owners of
8 Vermont Yankee), a run up in electricity market prices resulting from market
9 power or shortage, and the introduction of climate change or other environmental
10 policies that favor nuclear power.

11 Q. Can you comment on the symmetry of the transferred risks versus the abandoned
12 benefits?

13 A. There is no generally accepted manner to assign probabilities to these risks
14 and benefits. Generally, the trend in the nuclear industry and at Vermont Yankee
15 in the last five years has been increasingly better economic performance. The
16 possibility of continuing this upside trend is discussed by DPS witness David
17 Schlissel. On the other hand, unanticipated expenses, such as those associated
18 with an extended outage in 1998 or the design basis documentation program in the
19 late 90's, have occurred at Vermont Yankee.

20 A specific area of concern seems to be high-cost unanticipated risks. It

1 may be useful to consider some specific high-cost scenarios and attach illustrative
2 costs in order to provide some sense of the magnitudes involved.

3 Q. What are examples of risks and uncertainties that could be considered in weighing
4 the risk transfer in proposed sale?

5 A. Among the risks and uncertainties that should be considered in evaluating
6 the sale of Vermont Yankee are:

- 7 1. Extended, but temporary, outage
- 8 2. Equipment or regulatory problems at Vermont Yankee leading to
9 permanent shutdown
- 10 3. Generic problems at nuclear plants affecting a number of Entergy
11 plants
- 12 4. Low market prices leading to permanent shutdown
- 13 5. Unexpected decommissioning fund shortfall
- 14 6. Nuclear accident at another plant invoking Price-Anderson
- 15 7. Improved nuclear performance
- 16 8. Use of the site for other purposes (e.g., new gas fired generation)
- 17 7. Market power or shortage leading to extremely high market prices
- 18 8. Climate change or other environmental policy favoring nuclear power

19 Q. Can you illustrate, at least in part, how one of those scenarios might alter the risk
20 profile faced by the public?

1 A. To some extent, as I will try to illustrate using one particular risk. To
2 ensure logical correctness, it is necessary to compare each scenario to the same
3 reference scenario over the 2002 to 2012 plant license life. In this example, I will
4 refer to six specific scenarios that address this particular risk:

- 5 1. Keep-No Outage Case – The scenario where we chose to keep the
6 plant and a one year outage does not occur.
- 7 2. Keep-Outage Case – The scenario where we chose to keep the plant
8 and a one year outage does occur.
- 9 3. Keep-Permanent Outage Case – The scenario where we keep the plant
10 and a one year outage does occur and causes the owners to
11 permanently shut down.
- 12 4. Sell-No Outage Case – The scenario where we chose to sell the plant
13 and a one year outage does not occur.
- 14 5. Sell-Outage Case – The scenario where we chose to keep the plant and
15 a one year outage does occur.
- 16 6. Sell-Permanent Outage Case – The scenario where we chose to sell the
17 plant and a one year outage does occur and causes the owners to
18 permanently shut down.

19
20 The first scenario, the Keep-No Outage Case, will serve as the “zero point”

1 to which the other scenarios will be compared. It employs the assumptions in the
2 Synapse Reference Case described in Section 5 of my testimony. Please note that
3 all dollar amounts in the following discussion are in 2001 present value dollars, and
4 the itemized impacts may not include all significant effects. I present it as an
5 illustration of how risks can be analyzed.

6 Consider the possibility that at some point during the period 2002 to 2012,
7 there is an equipment, regulatory or operational problem that results in the plant
8 needing to be out of service for one year. This is the Keep-Outage Case in the
9 example. This scenario is possible, but of low probability. For illustrative
10 purposes, I will assume that the outage takes place during calendar year 2007 and
11 that market prices for power in each year equal the Department's market price
12 projection.

13 Q. How would such a one year outage affect the Keep-No Outage Case costs?

14 A. In the Keep-Outage Case, Vermont Yankee retains ownership of the plant
15 and one outcome is that the outage cause will be repaired and the plant will
16 continue to operate normally the remainder of its license life, since the current
17 sponsorship agreements provide access to capital for the costs of weathering the
18 outage. For this assumption, the effect on ratepayers, relative to our Keep-No
19 Outage Case, would be:

20 1. a \$107 million cost for replacement power at the market price for that

1 year;

2 2. some cost, possibly large, for fixing the cause of the outage; and

3 3. a savings of \$11 million in nuclear fuel costs for that year

4 The total change from the Base Case Keep Scenario would be additional
5 costs of \$96 million plus outage “repair” cost.

6 On the other hand, if VYNPC elected to close the plant (the Keep-
7 Permanent Outage Case), the effect on ratepayers, relative to the Keep-No Outage
8 Case, would be:

9 1. The cost of replacement power for 2006 through 2012;

10 2. The difference between annual operating costs if there is a shutdown in
11 2007 and annual operating costs under normal end of life operation
12 (this includes the nuclear fuel costs savings);

13 3. Special additional costs (not included in the shutdown EOL costs) to
14 get to decommissioning.

15 Assuming that number 3 is \$50 million, the total of these three together
16 would be about \$170 million in costs above those in the Keep-No Outage Case.

17 Q. What would the impact of this outage scenario be upon the Sell Cases?

18 A. In the Sell Cases, ENVY would buy the plant under the transaction as
19 proposed. With the outage, again assuming that the Department’s market price
20 forecast applies, it is unclear but certainly doubtful whether ENVY would be able

1 to absorb the cost of a full year of plant operating costs (possibly \$130 million),
2 plus some amount, possibly large, for fixing the cause of the outage, especially
3 with the loss of revenue under the PPA, Power Schedule B, and uprate power. I
4 will consider both possible outcomes.

5 First, if ENVY is able to and chooses to weather that outage and continue
6 operation (the Sell-Outage Case) then the likely effect on ratepayers, relative to the
7 Sell-No Outage Case, would be a \$9 million net cost for replacement power at the
8 market price vs. the PPA price for that year. This would offset the \$13 million
9 benefit from the sale. Therefore, compared to the Keep-No Outage Scenario, it
10 would result in a \$4 million benefit.

11 Alternatively, if ENVY is not able to weather that outage and to continue
12 operation or chooses not to do so, the result would be a permanent shutdown of
13 the plant. In that event, the likely effect on ratepayers, relative to our Sell-No
14 Outage Case, would be a \$9 million excess power cost for the outage year (2007)
15 plus \$65 million excess power costs for the remaining years of the PPA (2008 to
16 2012). This total net replacement power cost of \$74 million is the difference
17 between the PPA price and the Department's market price forecast. The likely
18 effect on ratepayers relative to our Sell-No Outage Case would be that \$74 million
19 net cost for replacement power. Therefore, compared to the Keep-No Outage
20 Case, this would result in a cost of \$61 million to ratepayers, plus a possibly large

1 amount of costs that are dropped by ENVY.

2 Q. What do you mean by “costs that are dropped by ENVY?”

3 A. The outage scenario would put a significant financial stress on a thinly
4 capitalized LLC. If ENVY bankruptcy is assumed because ENVY is unable or
5 unwilling to bear the costs of plant fixed costs for one year plus remedial costs for
6 the cause of the outage, then it is uncertain whether ENVY would likewise be able
7 or willing to manage the unexpected shutdown and decommissioning. If it is
8 assumed that the working capital line of credit from Entergy Global Investments,
9 Inc. (“EGI”) is exhausted at the beginning of the extended outage, then the
10 remaining \$35 million line of credit from Entergy International Holdings, Ltd.,
11 LLC (“EIHL”) would most likely not be sufficient to fully pay the expenses,
12 estimated to be between \$50 million and \$80 million, necessary to begin using the
13 decommissioning fund. Therefore, the source of funds necessary to bring Vermont
14 Yankee to a point where it can begin using the decommissioning fund is uncertain.
15 I call these “dropped costs.” There could also be significant legal fees and similar
16 expenses to Vermont ratepayers or taxpayers to address such a situation.

17 Q. Could you please summarize this example?

18 A. In the Table, below, I have summarized the costs for the six cases in this
19 outage scenario example.

20 Summary of Outage Scenario Costs
21 (Millions of 2001 present value dollars)

	No Outage Case	Outage Case (12 month outage in 2007)	Permanent Outage Case (beginning in 2007)
Keep	0 (as a reference point)	96 plus repair	170
Sell	-13	-4	61 ¹

Negative numbers represent a benefit to ratepayers relative to the Keep-No Outage Case; positive numbers represent a cost relative to the Keep-No Outage Case.

Please bear in mind that while some of the dollar amounts used in the above discussion may be precise, I have not attempted to include all the possible costs to factor in all the related uncertainties and contingent events.

Q. What do you conclude from this illustrative example?

A. First, reviewing the table above, it can be seen that the exposure to sponsors and ratepayers may be reduced. However, there is an important issue to keep in mind when considering the results in the table. For the Keep decision, I consider it more likely that continued operation would be chosen by VYNPC since sponsor agreements provide access to capital. For the Sell decision, I consider shutdown more likely because of ENVY's limited access to guaranteed capital and necessity to turn a competitive profit. DPS witness Andrea Crane specifically

¹ In this situation (Sell-Permanent Outage Case) after bankruptcy and after financial assurance funds are exhausted, the source of funds to meet what I have called dropped costs is uncertain. The \$61 million figure in this cell does not include any dropped costs.

1 demonstrates this in her testimony. Therefore, there is some transfer of risk, but
2 this is tempered by the uncertainty of who will pay costs and manage
3 decommissioning if ENVY declares bankruptcy.

4 Second, I conclude that the petitioners should have considered a number of
5 such scenarios both against the Sell and Keep Cases, as well as with and without
6 license extension.

7 Q. Have the Petitioners adequately analyzed the effect of these uncertainties?

8 A. No, they have not. Their discussion of risks and risk transfer is cursory and
9 vague, as well as partly focused on the risk profile faced by the Sponsors rather
10 than the ratepayers and the public. From their risk discussion, it is not possible to
11 form a comprehensive balancing of those risks, the economics and the other facets
12 of the transaction discussed elsewhere in my testimony, and in the testimony of
13 other Department witnesses.

14

15 **8. Costs and Benefits to the Buyer**

16 Q. What are the costs and benefits of this transaction to the buyer, Entergy?

17 A. The main cost elements of the transaction to Entergy Nuclear Vermont
18 Yankee, LLC ("ENVY") are the purchase price, and the ongoing costs of owning
19 and operating the Vermont Yankee plant. Under the Power Purchase Agreement,
20 ENVY then has the obligation to sell electricity to Vermont Yankee for use by

[illegible]

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10 ***** END CONFIDENTIAL MATERIAL*****

11 Q. Does this conclude your testimony?

12 A. Yes.